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**HAWAII AGRICULTURAL EXPERIMENT STATION  
HONOLULU, HAWAII**

Under the Joint Supervision of the  
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**FOWL POX (SOREHEAD) CONTROL  
BY VACCINATION**

BY

C. M. BICE, Poultry Husbandman



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## HAWAII AGRICULTURAL EXPERIMENT STATION HONOLULU, HAWAII

(Under the joint supervision of the University of Hawaii, and the Office of Experiment Stations, United States Department of Agriculture.)

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*Chief, Office of Experiment Stations*

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By C. M. BICE, *Poultry Husbandman*

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## Introduction

Fowl pox (sorehead), identified as *Epithelioma contagiosum*, is one of the most serious diseases of baby chicks and growing poultry in the Territory of Hawaii. (Fig. 1.) Very few farms have escaped the attacks of this disease, and it results in a high mortality yearly. The disease is widespread throughout the islands, and threatens all the poultry farms. Because of its presence in young chicks the Hawaii Agricultural Experiment Station made a study of the value of a "live virus" vaccine in developing immunity against the disease. Previous work at the station showed that the disease is transmitted to chicks by mosquitoes. Birds kept in mosquito-proof houses were found to remain free from the disease, whereas those transferred to laying quarters which were not mosquito-proof contracted the disease, with the result that egg production decreased and the death rate was high.

The author has prepared a vaccine that gives immunity to chicks as young as 4 weeks; consequently, young chicks may now be moved to range brooder houses that are not mosquito-proof as early as the seventh week if the chicks are vaccinated at 4 weeks of age.

Van Heelsbergen (5)<sup>1</sup> in 1926 introduced a vaccination product which he termed "Antidiphtherin" and reported it to give immunity against fowl pox when applied to a scarified area on the leg of the bird. Several investigators since 1927 have found the use of a "live virus" vaccine to be a successful means of

<sup>1</sup> Italic numbers in parentheses refer to Literature Cited, p. 13.



Figure 1—Wartlike eruptions on the comb of a young cockerel affected with fowl pox.

developing immunity in fowls. Johnson (3), Sawyer (4), and Beach and Freeborn (1) are among those who recommend a live virus vaccine. The author while on a trip to the Pacific Coast in 1930 met Messrs. Sawyer and Johnson, who were then vaccinating birds successfully with a live virus vaccine. The method advocated in this circular is based on their method, but has been modified to suit Hawaiian conditions. The strain of vaccine successfully used on 4 week old chicks was developed by the author.

### Experimental Trials

The strain of vaccine used in these studies was developed from lesions removed from chicks that had a natural outbreak of pox at 6 weeks of age. More than 150,000 chicks varying in age from 4 to 12 weeks were vaccinated with this vaccine with excellent results. The first group was vaccinated when 1 day old and at intervals of a week thereafter until 12 weeks of age. At the end of the first year the chicks that were vaccinated under 6 weeks of age showed a mortality of at least 50 per cent.

In the second and third year a change was made in the method of preparing the vaccine so that the chicks might be vaccinated as early as the fourth week of age. Four to 12 week old chicks showed a mortality of less than 5 per cent. A vaccine for 2 week old chicks is in course of preparation.

The "stick" method was used—the web portion of the right wing being pierced once. The wing was chosen because of the



Figure 2—Piercing a portion of the web of the right wing.

ease and rapidity with which the birds could be handled. (Fig. 2.) The percentage of "takes" was high in both experimental and field trials, seldom falling below 95 per cent.

### **Field Trials**

In 1931 a flock of 800 chicks varying in age from 5 to 24 weeks was vaccinated on a breeding farm. Results showed that vaccination decidedly weakened birds approaching the laying period and caused a considerable decrease in the production of laying fowls. On the same farm in 1932 and 1933 chicks varying in age from 4 to 8 weeks were vaccinated with less than 3 per cent of mortality. This flock has produced more than 200 eggs per bird for the past 2 years.

A total of 18 field trials was made with good results under varying conditions of climate, breeding, and management. In a few of the field trials where the flocks were beginning to show characteristic sorehead lesions vaccination was entirely satisfactory, but it was of no benefit where the disease had become firmly established.

### **Who Should Vaccinate?**

Every poultryman who has had outbreaks of fowl pox in chicks and growing stock should vaccinate his poultry. All breeders purchased from the mainland should be vaccinated before they are sent to the islands or immediately upon their arrival. Poultrymen who have never had pox on their farms should not vaccinate their stock because once the virus is used the flock must be vaccinated yearly. Chicks should be in the best of health before they are vaccinated.

### **Age at Which to Vaccinate**

From experimental and field trials during  $3\frac{1}{2}$  years the station found vaccinations with chicks ranging in age from 4 to 12 weeks to be successful, and mortality in chicks vaccinated at less than 4 weeks of age to be high.

### **Care of Chicks Before and After Vaccination**

The birds should be placed on a wet mash one week prior to vaccination and receive in addition their regular ration. Only one feeding of the wet mash—at noon—should be given daily, but it should be continued until feed consumption and growth have become normal. This usually requires from 4 to 6 weeks.

Chicks to be vaccinated should be free from disease, especially from coccidiosis. To prevent the disease entering the flock the chicks should be given a milk flush treatment one week prior to vaccination. When the chicks are 3 weeks of age they should receive a 40 per cent milk mash for 3 consecutive days. On the fourth day they should be given one-half the regular chick mash and one-half of the 40 per cent milk mash. On the fifth day they should receive the regular chick mash but none of the 40 per cent milk mash. This treatment should be repeated in the sixth and again in the twelfth week. The use of Epsom salts is not required.

Further methods of preventing disease entering the flock are to be found in sanitation and management. The chicks should not be allowed to become overcrowded, overheated, or chilled. Wild birds and human visitors should be excluded from the houses and runs. The chicks should be fed a well-balanced ration from troughs. Chicks from infested areas should not be purchased. The brooder house should be frequently sprayed with a poultry house disinfectant, or a fire torch may be used on non-burnable material.

After the chicks have been vaccinated and placed in the laying quarters the brooding equipment should be thoroughly disinfected, preferably with a fire torch.

The chicks should be kept in mosquito-proof houses until it is certain that the flock is free from disease, or for about 3 weeks. For best results, the chicks should be allowed to remain in mosquito-proof houses from the time they are hatched until 3 weeks after they are vaccinated.

### Equipment for Vaccination

A modern block 3 inches square on the upper and lower surfaces and 2 inches deep, with a hole in the center, may be used to hold the test tube or vial containing the vaccine. Rubber gloves should be used to protect the hands, especially if they have an open wound. A sharp-pointed knife, about  $1/16$  to  $1/8$  inch wide, with a  $1/8$  inch band of tape placed  $1/8$  inch from the point, may be satisfactorily used on chicks. (Fig. 3.) However, for turkey poults a very fine needle point is used. The vaccine is prepared in the laboratory and the powder and liquid are mixed about 15 minutes before the birds are vaccinated.



Figure 3—Equipment used in vaccinating chicks and poults.

### Method of Vaccinating

The vaccinator should be careful not to touch the head of the bird to be vaccinated. Vaccine may adhere to the rubber gloves and coming in contact with the head would subject it to infection. The powder and liquid are thoroughly mixed, the knife is dipped into the tube holding the vaccine, and the web of the right wing is pierced only once. The large blood vessels should not be pierced (Fig. 2). Three persons are necessary for rapid work, one to catch the bird, another to hold it, and still another to do the stabbing. Vaccine remaining after the birds have been vaccinated should be burned along with the container. The vaccine should not be kept in the light or the sunshine.

### Reaction to the Vaccine

On the seventh day following vaccination the pierced portion of the wing shows inflammation, and on the tenth day it develops a small white blister. This blister or "lesion" grows rapidly and

forms a scab that falls from the wing in 3 to 4 weeks. When the vaccination is successful the blister is called a "take." If only a small portion of the birds develop "takes," they should be revaccinated with new vaccine. The vaccine prepared by this station has given over 95 per cent of "takes" in most instances.

The vaccinated birds show a decrease in feed consumption and a slowing down in growth. After the fifth week or so they become normal and grow rapidly. At the station egg production was found to have increased in the laying flock due to the fact that fowl pox did not occur during the laying period, and immunity has lasted during the lifetime of the birds. Breeding hens that were vaccinated in 1931 have not been attacked by fowl pox.

### Vaccination of Turkeys

Turkey poults were successfully vaccinated from the third to the sixteenth week. (Fig. 4.) The method used is as described



Figure 4—Vaccinating a 4 week old poult in the web of the right wing.



Figure 5—Poult with fowl pox. Note the eyes are closed by pox lesions.

for chicks with the exception that the knife (Fig. 3) differs in size and the vaccine in strength. When ordering for poults, poultrymen should specify that turkey poults and not chicks are to be vaccinated. Turkey poults, when attacked by fowl pox, are difficult to cure. (Fig. 5.) Prevention by vaccination is the safest way to protect turkeys against this disease.

### Questions and Answers

1. What is fowl pox?

Fowl pox is a highly infectious disease that attacks chickens, turkeys, and other birds. Characteristic wartlike sores appear on the face, the comb, and the wattles. In turkeys the lesions or sores may be found on the body or on the legs.

2. What causes fowl pox?

Fowl pox is caused by a filterable virus.

3. Is the mortality from this disease very high in Hawaii?  
Between 25 and 35 per cent of the chicks hatched die or are made worthless as layers by this disease.
4. What is the name of the method of vaccination recommended in this circular?  
The method as advocated in this circular is known as the "stick" or "stab" method.
5. How young can chicks and turkey poults be successfully vaccinated?  
Not less than 4 weeks old.
6. Do vaccinated chicks become droopy and lose their appetite?  
Yes. About the tenth day following vaccination they show droopiness and a decrease in feed consumption.
7. How long after vaccination before the chicks fully recover?  
In about 5 or 6 weeks after vaccination.
8. Is it advisable to vaccinate pullets after they have begun to lay?  
No. Such pullets at the station showed a decided decrease in egg production.
9. Is it necessary to keep chicks in mosquito-proof houses before and after vaccination?  
Yes. If chicks are kept in open houses the disease may be spread by the mosquito before vaccination can be done. After the chicks are vaccinated they should be allowed to remain for 2 to 3 weeks in the mosquito-proof house.
10. Is it necessary to vaccinate new birds yearly after the flock is once vaccinated?  
Yes.
11. May all the flock in one pen only be vaccinated when a long continuous brooder house is used?  
No. All chicks in the house must be vaccinated at one time.
12. Are colony brooder houses satisfactorily used for brooding when vaccination is practiced?  
Yes. One house of chicks may be vaccinated at a time without injury to the other chicks, especially where the confinement system is used, or where each brooder house has a separate yard.
13. Should weak chicks be vaccinated?  
All chicks to be vaccinated must be free from disease and in good health.
14. Why feed a wet mash during the period immediately preceding and following vaccination?  
To increase feed consumption because there is a decrease in dry mash consumption after the birds are vaccinated.

15. Does vaccination retard laying in pullets?

It does not retard the beginning of the laying period for more than 2 to 3 weeks. In some flocks the birds came into egg production at about the same time as when vaccination was not practiced.

16. Is risk associated with vaccinating with a "live virus" vaccine?

Yes, especially if the chicks are not healthy or if disease enters the flock during the period in which immunity is being developed.

17. Should chicks be vaccinated after they have a natural outbreak of the disease?

At the station several successful attempts were made to vaccinate flocks in which a few of the birds were just beginning to show lesions. However, where the disease had progressed so that the entire flock was affected, vaccination was of no value.

18. Is vaccination a cure of the disease or a means of preventing it?

Vaccination is best used as a preventive of the disease. (See answer to question 17.)

19. Is the vaccine recommended made from chicken or from pigeon scabs?

The vaccine prepared by the University of Hawaii and used in its research and field trials is made from chicken scabs.

20. Does more than one type of pox attack birds in Hawaii?

Two types of pox attack the birds, a wet pox in which there is a watery discharge from the eyes, and a dry pox which is characterized by wartlike nodules on the face, the comb, and the wattles. Vaccination prevents both.

21. What is the cost of vaccinating chicks?

Approximately 1 cent each.

22. Is it good practice to move the birds into other houses at the time they are vaccinated?

No. The chicks should be moved at least 1 week before vaccination time so that they will have become adjusted to their new surroundings.

23. At what age is the reaction to vaccination least severe?

Chicks between the eighth and twelfth week showed the least reaction in both experimental and field trials.

24. How soon after vaccination may the birds be eaten?

In not less than 30 days.

25. Does the vaccine prevent other diseases and ailments from attacking the flock?

It does not. It is for fowl pox only.

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